Soil Quality and Productivity Monitoring:
Game Range Stewardship Project
June 15, 2001

A field inspection of potential harvest and burn units was conducted on June 7 and 11, 2001 within the proposed Game Range project area on the Plains Ranger District. The field evaluation was done to monitor if detrimental soil conditions exist in the project area. Parameters assessed in the field included surface erosion, displacement, rutting, compaction, burning, mass movement, vegetation growth and organic/course woody debris as outlined in FSM, R1 supplement 2500-99-1.

All proposed units with previous harvest activity were evaluated as well as two un-harvested control units. Methods of analysis included a combination of the following visual and qualitative methods. Photo points, soil pits, transects, tile spade penetration along with the Lolo LSI interpretations and the USDA Forest Service Photo Guide for Appraising Downed Woody Fuels in Montana Forests. Unit descriptions, field findings and recommendations follow.

UNIT 22- LSI 16UA. No previous commercial harvest. Pre-commercial thinning was done in the late 1960's. The unit has very little natural regeneration in the understory but a heavy grass and shrub community is present. Stand age and tree heights are fairly uniform. No noxious weeds present. Course woody debris (CWD) is approx. 3-6 tons/acre within what is expected in a more open Ponderosa Pine type. Recommended CWD range from 5-10 tons/acre. Soil pits were dug along a random transects and used for calibration and comparison to other units. No detrimental soil conditions existed in this unit.

UNIT 11- LSI 16UA, 72 acres. No signs of surface erosion, rutting or puddles from management activities was observed. One old vegetated road prism dissects the unit with a 1.5 ft cut and has no signs of compaction was found on the prism but the cut accounted for a small area of soil displacement. The stand is un-even aged with some understorys regeneration. CWD was adequate or above forest recommended levels(20+ tons/acre) in the upper portion of the unit. The lower portion of the unit had less than 15 tons/acre CWD, suggesting a better overall distribution of woody debris should be attained at the next entry into this unit.

Previous harvest in this unit occurred in the 1950's/60's and a recent individual tree salvage in 1998/99. Recent skid trails and landings are still visible. Soils at the landing, along major skip trails and on a short temp. road had a layer of platy structure. This was a sign of increased bulk density (compaction). These were vegetated with grass, small shrubs and planted seedlings. Older pre-1990's harvest skid trails were not widely visible

within the unit. Three short random transects were done within the unit for comparison to a un-harvest unit. Soil pits were dug to look for signs of compaction and root damage. Pits had little resistance digging with the tile spade, no evidence of root damage or restriction from compaction. Overall detrimental soil conditions exist in less than 4% of the unit, well within Regional standards.

UNIT 26/27- LSI 16UA. This unit was harvested in the 1960's. No signs of surface erosion, rutting or puddles from management activities was observed. Several skid trails do exist in the units. Soil pits dug showed a slight compacted layer on one skid trail in the top 3" of the soil profile. Grass and shrub root restriction was not evident on these trails. The stand is uneven aged with some understory regeneration and a grass/shrub community. CWD is within the range for this habitat type. Detrimental conditions exist on less than 2% of this unit, well within the standard.

UNIT 231- LSI 16UA. Old previous harvest similar to the above units several visible vegetated skid trails. Slight compaction was found on several skid trails but none within the general unit area. No signs of surface erosion, rutting or puddles from management activities was observed. Soil rock content was higher in the upper portion of the unit. No compaction was found in these rockier areas. No detrimental root restriction was found. The stand is uneven aged with grass, shrub and some small conifer regeneration. CWD was less than 10 tons/acre. This is below guidelines but did not appear to be adversely affecting productivity. Overall detrimental conditions do to skid trails existed on less than 2% of the unit, well within standard.

UNIT 391- LSI 22MA. No signs of surface erosion, rutting or puddles from management activities was observed. Soils in the unit have a higher angular rock content then those above. Difficulty digging pits in this unit was from this higher rock content. Previous harvest activity included light selection harvest in the 1960's and some light treatment in the 1970's. CWD in the unit appeared to be in the 10+-tons/acre range, adequate for this P.Pine stand. A large component of Douglas Fir encroachment was noted. Several skid trails and older vegetated roads were visible. Compaction was found in spots on the old roads but was not uniform. The skid trails had some platy structure but did not appear to be very detrimental when looking at root structure. Overall detrimental soil conditions existed on less than 2-3% of the unit, well within the standard.

UNIT 341- LSI 22MA. No signs of surface erosion, rutting or puddles from management activities was observed. Visible skid trails had grass and shrub vegetation with minimal compaction and little to no root restriction noticed. Past selective harvest did not appear to adversely effect soil condition or productivity in the unit. Soil quality is within standard.

UNIT 331- LSI 22MA/16UA. No past harvest activity was found in this unit. CWD appeared to range from 10-15+ tons/acre higher than recommended for the P.Pine habitat.

Extensive Douglas Fir encroachment was noted. Soil pits in the unit showed some light platy structure but no root restriction and not caused by management activity. The stand is very shaded with low conifer regeneration. No detrimental soil conditions were noted.

Summary- In units inspected compaction was confined primarily to skid trails or old roads. In several cases the existing compaction did not appear to be detrimental to overall productivity based on regeneration and root conditions. No additional productivity concerns were identified or noted by the project forester during our field inspection. No signs of surface erosion, rutting or puddles from management activities were noted in any of the units. Soil parent material in the area is primarily derived from the Belt Supergroup and is fairly stable. The course woody debris range was not a limiting factor in productivity. CWD was within or above recommended amounts in most units. Observation on adjacent MT Fish, Wildlife and Parks ownership had heavier past harvesting and the FS un-harvested units provided a range of soil quality conditions for field calibration.

Additional Observations:

- The Weber Gulch trailhead road that accesses unit 11 will require additional road surface drainage as well as maintenance of existing waterbars and road prism to meet BMP standards.

- For harvesting in unit 331, consideration of a forwarder is recommended do to the longer skidding distances. This equipment would allow work over a slash mat and reducing the number of passes reducing soil disturbance.

- In general existing skid trails or old roads is recommended for use to reduce the amount of new or additional soil disturbance. Roads and skid trails used will be stabilized according to the project management requirements.

If you have questions or need additional information please contact me.

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